LAWRENCE LIVERMORE REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: Nov. 17 - Nov. 24, 2008.

Wall Street Journal highlights LLNL's supercomputers

Hyperion is a next-generation Linux cluster testbed.

Supercomputers are showing surprising signs of new life.

New chip technology and industry alliances are bringing rapid advances to these high-performance machines, feeding demand at a time when the personal computer industry is sagging.

In one development, Lawrence Livermore National Laboratory last week announced an alliance called Project Hyperion with 10 companies -- including Dell Inc., Intel Corp. and Cisco Systems Inc. -- to build a big supercomputer that will serve as an industry test bed.

Hyperion debuted at SuperComputing 2008 and was introduced by keynote speaker Michael Dell, CEO of Dell, one of the lead collaborators.

"Hyperion represents a new way of doing business. Collectively we are building a system none of us could have built individually," said Mark Seager, LLNL project leader. "The project will advance the state-of-the-art in a cost-effective manner, benefitting both end users, such as the national security labs, and the computing industry, which can expand the market with proven, easy to deploy, large- and small-scale Linux clusters."

To read the *Wall Street Journal* article, go to https://newsline.llnl.gov/_rev02/articles/2008/nov/images/Hyperion/wall_street_journal_hyperion.pdf To read more about Hyperion, go to https://newsline.llnl.gov/_rev02/articles/2008/nov/11.21.08-hyperion.php

Anti-matter that matters

Physicist Hui Chen sets up targets for the anti-matter experiment at the Jupiter laser facility.

Take a gold sample the size of the head of a push pin, shoot a laser through it, and suddenly more than 100 billion particles of anti-matter appear.

The anti-matter, also known as positrons, shoots out of the target in a cone-shaped plasma "jet."

This new ability to create a large number of positrons in a small laboratory opens the door to several fresh avenues of anti-matter research, including an understanding of the physics underlying various astrophysical phenomena such as black holes and gamma-ray bursts. Anti-matter research also could reveal why more matter than anti-matter survived the Big Bang at the start of the universe.

"We've detected far more anti-matter than anyone else has ever measured in a laser experiment," said Hui Chen, a Livermore researcher who led the experiment. "We've demonstrated the creation of a significant number of positrons using a short-pulse laser."

Lab researchers recently presented this work at the American Physical Society's Division of Plasma Physics.

To read more, go to https://newsline.llnl.gov/_rev02/articles/2008/nov/11.21.08-antimatter.php

KTVU features Livermore's plans for new energy production

KTVU reporter John Fowler recently detailed what may be the answer to America's energy needs.

He reported on a project coming out of the Laboratory's National Ignition Facility called LIFE (Laser Inertial Fusion-Fission Energ), a new kind of power plant that would use spent nuclear fuel, create less wastes and leave no risk of the waste being used to make nuclear weapons.

It would be the first step toward creating energy on Earth the same way the stars create it.

Lab Director George Miller and Gov. Arnold Schwarzenegger comment on the new technology.

To see the news footage, go to https://publicaffairs.llnl.gov/news/llnl_reports/schwarzenegger_ktvu_10nov2008.mov

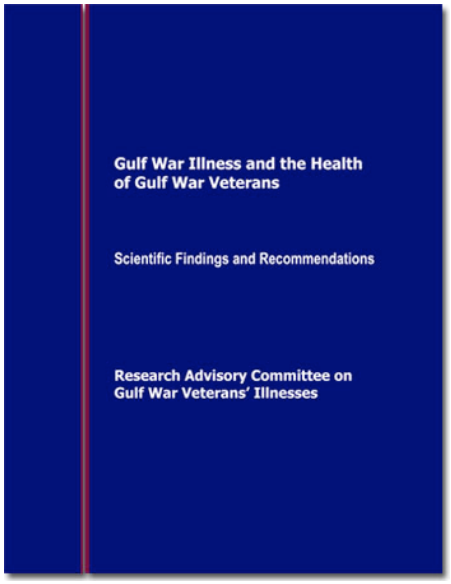
LLNL research tops the cover of the *New Journal of Chemistry*

An LLNL paper on the purification and recrystallization of the explosive, TATB (1,3,5-triamino-2,4,6-trinitrobenzene) by researchers Yong Han, Philip Pagoria, Alexander Gash, Amitesh Maiti, Christine Orme, Alexander Mitchell, and Laurence Fried has been selected by the editors of *New Journal of Chemistry* for the cover of the January 2009 issue.

In the paper, Han of the Physical and Life Sciences Directorate and his colleagues further report their results from the Transformational Materials Initiative-funded work on solvation and purification of TATB from ionic solvents. Specifically, this article provides details of the recrystallization (crystal initiation and growth) of TATB, and the quality and enhanced function of the resulting crystals.

The *New Journal of Chemistry* is an international journal, published by the Royal Society for Chemistry since 1998.

LLNL contributions referenced in Gulf War syndrome report



Technical results from LLNL's Center for Accelerator Mass Spectrometry (CAMS) were included in the report "Gulf War Illness and the Health of Gulf War Veterans: Scientific Findings and Recommendations," which was released last week by the congressionally mandated Research Advisory Committee on Gulf War Veterans' Illnesses.

Specifically, the report referred to an ongoing CAMS collaboration with the University of New Mexico studying inhalation penetration of depleted uranium into brain tissues, and described toxicity studies at CAMS that supported the overall conclusion that a chemical given to the troops for protection against nerve agents and pesticide use during deployment are "causally associated with Gulf War illness."

LLNL/UC publications cited were: "Pyrethroid Decrease in Central Nervous System from Nerve Agent Pre-treatment" in the *Journal of Applied Toxicology* and "Protein Binding of Iisofluorophate *in vivo* After Coexposure to Multiple Chemicals" in *Environmental Health Perspectives.*

For more on the report, go to http://www.vmwusa.org/images/stories/gwi_and_health_rac_gwvi_report_2008.pdf

Latest edition of weekly *Newsline* available

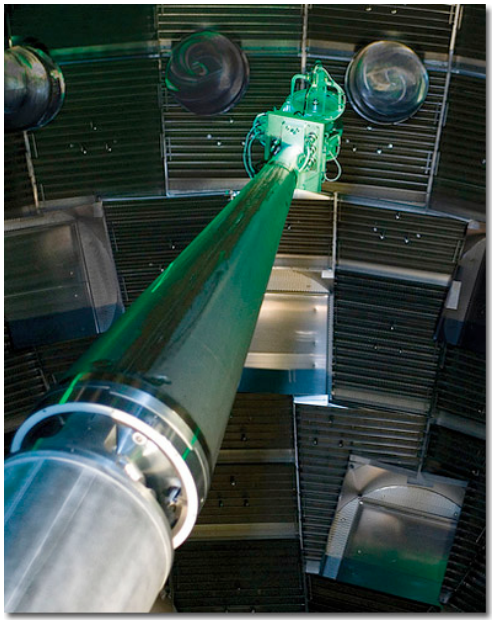
Newsline provides the latest Lab research and operations news.
See the most recent issue at https://newsline.llnl.gov/_rev02/index.php

Livermore Lab Report takes a break

LAWRENCE LIVERMORE
REPORT

The *Livermore Lab Report* will take a break from Nov. 24-Dec. 1. The report returns to its regular schedule with the next edition appearing Dec. 8.

Photo of the week



Beam me up -- Inside the 10-meter diameter target chamber at the National Ignition Facility at the Laboratory, a target alignment sensor positioner ensures that targets are aligned with all 192 laser beams.

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LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the Livermore Lab Report, send e-mail mailto:labreport@llnl.gov.

The Livermore Lab Report archive is available at: https://publicaffairs.llnl.gov/news/lab_report/2008index.html